Geo- Haz consulting, Inc.

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3D Quaternary Stratigraphy and Geomorphic Evolution of The San Gabriel Valley, Southern California

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Program Element II.5: Identify active faults, define their geometry and determine the characteristics and dates of past earthquakes.

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Abstract
This project is designed to capitalize on recent research to produce an integrated 3-dimensional characterization of the subsurface properties that may control the strength of ground shaking in future earthquake in the San Gabriel Valley. The catalyst is the recent production of digitized, 1:24,000-scale surfuical geologic maps for the seven 7.5' quadrangles that comprise the San Gabriel Valley. That mapping, which subdivided Quaternary deposits into 6 facies, 10 age g groups and 5 grain size categories, contains 102 distinct Quaternary map units over the 7-quad area. This detailed surficial mapping can now be combined with the existing geotechnical borehole data base, also in digital format, to generate subsurface cross-section “on the fly” with desktop GIS software. The ability, in turn, permits a more comprehensive correlation between surface geology and subsurface geology (particularly of the upper 30m ) than has previously been practical. In addition to these new analytical and data visualization opportunities, the tectonic framework of the area is now better understood in light of recent tectonic and tectonic geomorphology work on the Whittier fault, the Raymond fault, and the Sierra Madre fault. Movement on these structures dictates in large part the location and character of depositional systems that have filled the valley, so in a way tectonics controls sediment distribution, which then controls ground response. Using facies models for alluvial fans and plains, I am constructing a 3D interpretive model that integrated the surface geology, the observed geomorphic process, and the subsurface geology in the upper 30m or more. This facies-based model will be tested as a way to define the spatial limits of NEHRP soil class boundaries.
A major spin-off of this project would be San Gabriel Valley. A first draft of this monograph was written by the author in 1978 after I completed the surficial geologic mapping of the 7 quadrangles. However, I left the USGS before this monograph could be successfully transformed into an Open-File Report. In the ensuing 20 years much has been learned about the Valley’s tectonic, about tectonic geomorphology , in general, the surface geology and subsurface data have been digitized, and I have

gained more understanding of how tectonic affects depositional system. So, the time is now ripe to finally combine the data into a synthesis, and to see if a facies-based model can explain the variation in subsurface geotechnical properties better the existing , more empirical methods.